The NASA BDEC Team wishes all of you a very happy holiday season. As we end 2025, we are excited to share the latest news on our initiatives, success stories, and developments.

Announcements

NEW BDEC TEAM MEMBER

Welcome to Dr. Janet Nackoney!

Meet Dr. Janet Nackoney, our new Ecological Conservation Deputy Program Manager. Janet brings over 20 years of experience in Earth systems science, biodiversity conservation, and climate change mitigation to our program. Most recently, she spent 5 years at USAID developing geospatial products for conservation and climate programming, where she managed the joint USAID-

NASA SERVIR program that empowered governments worldwide to use Earth observations for environmental decision-making. As a former team member and University of Maryland research faculty, Janet secured multiple conservation grants and developed influential tools including a habitat model for endangered bonobos that contributed to IUCN conservation strategies and a NASA-funded decision support system for the Jane Goodall Institute. Janet's extensive background in capacity building, stakeholder engagement, and federal partnerships—including her experience as an AAAS STPF Fellow—makes her uniquely positioned to advance our program's mission.

IN THE NEWS

WMO Recognizes Animals as Sentinels of the Environment

For the first time, animal telemetry and specifically the potential of animals as sentinels of the environments (e.g. measuring essential climatic variables and complex climatological phenomena) have been recognized by the World Meteorological Organization (WMO) in their newest bulletin on climatic forecasting: Building Tomorrow's Observing Infrastructure: Technology Trends Shaping the Future of Hydrometeorological Monitoring. Specifically, WMO outlines the major infrastructure-related technological trends that are expected to influence the next 25 years.

Read Bulletin

NEW WEBINARS

Applications from NASA's ECOSTRESS and EMIT Missions

NASA and the Society for Conservation GIS (https://www.scgis.org/) hosted a two-part webinar series titled, Advancing Conservation and Community Resilience with Thermal and Hyperspectral Remote Sensing: Applications from NASA's ECOSTRESS and EMIT Missions. The webinars showcased thermal infrared and hyperspectral remote sensing applications for conservation. The November-December 2025 series featured NASA's ECOSTRESS and EMIT missions—International Space Station instruments providing detailed data on land surface temperatures, vegetation health, water quality, and other critical indicators for tracking ecosystem change and

climate impact. Presenters from NASA's Jet Propulsion Laboratory and three universities demonstrated diverse applications including coral reef monitoring in Belize, drought resilience assessment in Arizona, urban heat analysis, wildfire risk evaluation, and educational outreach programs for students and teachers.

Learn more and access webinar recordings

Going to the Annual AGU Meeting this Year? Look for us!

For those of you attending this year's AGU annual meeting, we have a number of recommended sessions and opportunities for you to learn about the impact of BDEC work. Not seeing your session on our website? Let us know and we will add it.

POSTER SESSION SY11B-0541

Dr. Maury Estes, NASA Marshall Space Flight Center

Maury, Associate Program Manager for the NASA Ecological Conservation Program, will be presenting a poster at this year's Science & Society Session on Impactful Science. The poster will feature work by Dr. Chuanmin Hu at the University of South Florida on mitigating the impacts of Sargassum in our coastal regions, Dr. Jill Deppe at the National Audubon Society on bird-friendly land management with Alas Seguras, and Dr. Charles Van Rees at the University of Georgia on managing floods with levee setbacks. Come speak with Maury December 15 in Hall EFG (08:30 - 12:00 local time).

Learn more

NASA BOOTH

Dr. Emily Iskin, Boise State University

Visit Emily at this year's NASA booth to learn about the Mesic Resource Restoration Monitoring Aid (MRRMaid) program. Led by Dr. Jodi Brandt at Boise State University, and supported by NASA's Ecological Conservation Program, the MRRMaid toolbox offers several satellite-based monitoring tools being used to understand how river ecosystems are changing through time.

Learn more

Awards

Lina María Sánchez Clavijo coordinated authorship of the new publication, "Monitoring Colombia's Biodiversity", which included contributions from 70 researchers at the Humboldt Biological Resources Research Institute.

Join us in congratulating Dr. Mary Blair's team for their work on the publication, "**Monitoring Colombia's Biodiversity**", which outlines a conceptual and methodological framework for biodiversity monitoring in the country and highlights project-related tools including **BioModelos** as key for the generation of time series of biodiversity data to inform decision-making. **Dr. María Cecilia Londoño Murcia** and **Mr. Daniel Fernando López Lozano** at the Humboldt Biological Resources Research Institute are among the 70 authors of the new book which is available to download for free and which received an **Honorable Mention in the Category *Science: Environment and Sustainable Development* - *Camila Botero Restrepo*** at the Alejandro Ángel Escobar National Awards for Science and Solidarity 2025.

Access Publication

Nick Russo (left) was awarded the Alexander Wilson Prize for Best Overall Student Oral Presentation

Congratulations to **Dr. Nicholas Russo** postdoc with Dr. Andrew Davies at Harvard University, for the **Alexander Wilson Prize for Best Overall Student Oral Presentation** on, "*Long-distance movements and behavioral variation of African hornbills diversify seed dispersal patterns*." The award was given at this year's Wilson Ornithological Society meeting in Los Angeles, California.

Learn more

New Publications

NEW PUBLICATION

Viewing the Lower Atmosphere as a Structured Habitat

Earth's lower atmosphere is a vital ecological habitat, home to trillions of organisms that live, forage, and migrate through this medium. Despite its importance, this space is seldom considered a primary habitat for ecological or conservation prioritization, making it one of the least studied environments. However, it plays a crucial role as a global conduit for the transfer of biomass, weather, and inorganic materials. Fundamental research is essential to address core ecological questions related to the ecological consequences of this habitat's intricate spatial and temporal structure. To advance our understanding of airspace use by migratory animals, we analyzed over 108 million 5-min radar observations from 143 NEXRAD sites, focusing on 24-h diel cycles across the contiguous United States. POC: Kyle Horton, kghorton@purdue.edu

Video Abstract and Publication

NEW PUBLICATION

Assessing Radar Datasets for National Forest Monitoring

This work represents foundational research necessary to catalyze the expanded operational role of NISAR L-band data in tropical forest monitoring. The study analyzes C-band and L-band SAR data within a well-defined, multi-stage deforestation framework, explicitly delineating and comparing detection capabilities across stages (early deforestation, fire management, and vegetation recovery). By going deep into assessing the sensitivity on the first stage of change—the transition of stable forest to logged forest—this research resolves common misunderstandings regarding the capabilities of C- and L-band backscatter, ultimately leading to more accurate, timely, and policy-relevant data for Earth system models. L-band-derived Radar Forest Degradation Index (RFDI) is highly sensitive to early deforestation, even when biomass remains on the ground soon after cutting. In contrast, C-band information showed limited ability to sense this critical initial stage of change but was much stronger at detecting later deforestation stages.POC: Africa Flores-Anderson, africa.flores@nasa.gov

Learn more

RECENTLY ACCEPTED

Conserving Kelp Forests in California

Marine Protected Areas (MPAs) are important for marine conservation, but their benefit on non-fished species such as giant kelp remain unclear. Using long-term satellite data from NASA Landsat and a novel paired reference site method, this publication analyzes kelp abundance before and after MPA implementation, including recovery from the 2014-2016 marine heatwave in California. The authors find that MPAs had modest positive effects on kelp abundance that varied by area, but these benefits became more evident following the major heatwave disturbance. Their findings suggests MPAs can benefit kelp forests, particularly in helping ecosystems recover from environmental stress.POC: Tom Bell, tbell@whoi.edu

Learn more

RECENTLY ACCEPTED

From Bio-logging to Conservation

In this publication, for the first time, the authors perform a global analysis of studies of movement ecology and find important gaps in where animal telemetry studies occur. Specifically, their main finding is very few studies in human dominated environments, potentially limiting our ability of understanding behavioral responses of wildlife to human activities. In addition they provide a forward looking vision for cutting edge bio-logging technologies.POC: Diego Ellis Soto, diego.ellissoto@berkeley.edu

Learn more

NEW PUBLICATION

Classifying Rocky Land Cover

Rocky land cover provides critical habitat for endemic, vulnerable, and threatened species of plants and animals, making it a conservation priority. However, existing land cover maps rarely classify rocky habitats explicitly or lack adequate spatial resolution or extent. In this study, the authors develop random forest models in Google Earth Engine to map rocky land cover at high resolution and across a broad spatial extent of Washington's Cascade Mountains and Columbia River Gorge. Their models incorporated spectral indices from Sentinel-2 and NAIP imagery, multi-temporal predictors using time series data, and topographical variables, though predictor importance

varied regionally. Through three case studies, they demonstrate how this replicable, open-source approach addresses land management needs and can be adapted for mapping other rare habitat types.POC: Joe Celebrezze, celebrezze@ucsb.edu

Learn more

NEW PUBLICATION

Characterizing Broken-Rock Habitat

Structurally complex habitats critical for wildlife survival are challenging to characterize using traditional methods. The authors developed a handheld photogrammetry workflow to map and measure fine-scale characteristics in broken-rock habitats, enabling better identification of key features for rock-dwelling wildlife. This approach addresses the limitations of labor-intensive traditional assessment methods that lack necessary fine-scale resolution. The authors present their workflow as a scalable and adaptable tool for fine-scale habitat characterization of structurally complex systems, providing information for species and habitat monitoring.POC: Ana Ferreira, ana.torresferreira@wsu.edu

Learn more

NEW PUBLICATION

Modeling Waterfowl Stopover Habitat in Eurasian Grasslands

This study introduces a new method utilizing MODIS and Landsat data for mapping ephemeral environmental conditions at fine scales, improving species distribution modeling. Applied in Eurasian drylands, the approach provides the first habitat estimates for migratory waterfowl species of conservation concern. The maps reveal that croplands serve as essential stopover sites for these birds, yet agricultural habitats remain largely excluded from existing protected area networks.POC: Natalia Rogova, nrogova@wisc.edu

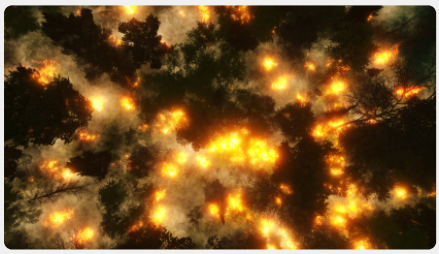
Learn more

NEW PUBLICATION

Observing Phytoplankton Assemblages in the Arctic

Existing approaches to monitor phytoplankton biodiversity are based on data from lower latitude oceans and cannot be applied directly to the Arctic Ocean. This study shows that phytoplankton absorption parameters can effectively distinguish assemblages dominated by relatively large phytoplankton (cell size >20 µm) from other phytoplankton communities, thus providing a means to study environmental impacts on phytoplankton biodiversity in the Arctic. Because phytoplankton absorption strongly influences ocean color observed with satellite optical sensors, this study supports the potential for long-term satellite-based assessment of changes in phytoplankton biodiversity, including those obtained from the PACE satellite mission.POC: Dariusz Stramski, dstramski@ucsd.edu

Learn more



NEW PUBLICATION

Assessing Fire Regime Effects on Western Wildlife Habitat

The work shows that bigger, more intense wildfires reduce beneficial habitat for mule deer, black bears, and cougars--species of high ecological and economic value. Whereas, low intensity fires such as prescribed fires can enhance habitats. NASA's satellite data (GEDI, Landsat, and MODIS) were essential for tracking vegetation recovery, mapping fire severity, and revealing how fire regimes reshape western wildlife habitat at landscape scales.POC: Neil Carter, nhcarter@umich.edu

Learn more

NEW PUBLICATION

Connecting Landscapes with CoLa

This paper describes the development and significance of a software tool, the Connecting Landscapes (CoLa) Decision Support System, that can be used to develop connectivity conservation scenarios and priorities for target species. The software tool is in use by the Wildlife Conservation Research Unit (which co-authored the publication) and their partners in Southeast Asia and southern Africa are

developing case studies that illustrate its use.POC: Patrick Jantz, Patrick.Jantz@nau.edu

Learn more

NEW PUBLICATION

Monitoring Coral Bleaching with Spaceborne Data

Using NASA airborne fluid lensing campaigns before and during the record-breaking 2023 heatwave, this study validated spaceborne SuperDove data to detect mass coral bleaching in the Florida Keys—demonstrating MarineVERSE's scalable remote sensing approach for real-time reef monitoring.POC: Julie B. Zimmerman, eic@est.acs.org

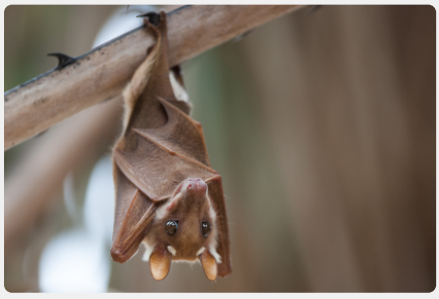
Learn more

NEW PUBLICATION

Assessing the Effectiveness of Oceanic Marine Protected Areas

This paper evaluates the relationship between a marine protected area (MPA) around Palmyra Atoll and tuna fish biomass using drifting fish aggregating device (dFADs) data. No relationship is found between this MPA boundary and tuna biomass emphasizing that more work is needed to evaluate the efficacy of the MPA.POC: Kydd Pollock, kydd.pollock@tnc.org

Learn more



NEW PUBLICATION

Understanding Fruit Bat Habitat Selection with Spaceborne LiDAR

This study is among the first to integrate spaceborne LiDAR data from the Global Ecosystem Dynamics Investigation (GEDI) sensor to understand animal movements and habitat selection in relation to 3D vegetation structure. The authors detail how 3D vegetation structure influences hammer-headed bat (Hypsignathus monstrosus) habitat selection in Cameroon, revealing population-level selection for intermediate canopy height, areas closer to canopy gaps, and longer movements through swamp habitats at two

different spatial extents. Additionally, individual bats varied widely in their preference for other attributes of vertical and horizontal vegetation structure. They also report highly directed displacements up to 17.7 km, with path recursions limited to three or fewer locations over the tracking period.POC: Nicholas Russo, nicholasrusso@g.harvard.edu

Learn more

NEW PUBLICATION

Linking 3D Models of Canopy Structure with UAS RS Data

This study combines hyperspectral, solar-induced chlorophyll fluorescence (SIF), and LiDAR measurements to show that canopy structural traits (leaf angle) control spatial variations in remote sensing signals. This is as far as the authors know the first time that terrestrial laser scanning (TLS) and drone-based SIF are measured together. The authors show, with empirical evidence, that leaf angle distribution of trees drives the spatial variation in remote sensing signals, and leaf angle is correlated with leaf traits (pigment concentration).POC: Xi Yang, xiyang@virginia.edu

Learn more

NEW PUBLICATION

Predicting Critical Forage and Water Resources for Wildlife

This study examines how predictable food and water resources shape the daily movements of mule deer in Utah. Using GPS tracking data from 225 deer and NASA satellite imagery, the team measured how consistent forage was across space and time. Results highlight that changing climate and land use, which alter the reliability of resources, can strongly affect deer energetics, space use, and ultimately population health. By leveraging NASA's Earth observation data, the study provides new insight into how wildlife adapt to shifting environments. This knowledge is critical for forecasting the impacts of global change on ecosystems and managing iconic species like mule deer.POC: Madeline Standen, madip@umich.edu

Learn more

NEW PUBLICATION

Monitoring Water Availability Driving Animal Movements

This study reveals how wildlife (mule deer in Southwest, USA) responds to rapid environmental change and highlights the growing risk of human–wildlife conflict as animals seek resources in agricultural areas. NASA's ECOSTRESS and MODIS satellite data provided critical, high-resolution insights into how water availability drives animal movements—information vital for climate adaptation and wildlife management in drying regions.POC: Martin Leclerc, m2lecler@uqac.ca

Learn more

NEW PUBLICATION

DHIs using MODIS and VIIRS for Biodiversity Monitoring

In this research, the authors generate global Dynamic Habitat Indices (DHIs) derived from MODIS C6.1 and VIIRS V2 vegetation products. They also develop accompanying quality and uncertainty layers for each DHI product to support applications across diverse research and management fields. Their results show that MODIS and VIIRS DHIs are generally consistent globally, with some regional differences. The proposed DHIs demonstrate excellent performance in predicting global species richness, particularly for the GPP-based DHIs.POC: Duanyang Liu, dliu292@wisc.edu

Learn more

Pictures from the Field

Left to Right:

1. Undergraduate students survey vegetation around a sapflow sensor on Tetiaroa Atoll, French Polynesia. Submitted by Michael Burnett, University of California Santa Barbara
2. Postdoc Dr. Sara Gonzalez (left) and Research Technician Ashland Aguilar (right) before sampling kelp in False Bay, Capetown, South Africa during the BioSCape Campaign (Oct 2023). Submitted by Tom Bell, Woods Hole Oceanographic Institution
3. Baka elder and forest guide Mbengue Moise (right) removes a sock meant to calm a white-thighed hornbill during the GPS tagging process. Project collaborator Nick Russo (left) prepares to release the bird, which carries a solar-powered GPS tag on its back. This project investigated the importance of 3D vegetation structure for the movements of a community of seed dispersers in the Dja Faunal Reserve, Cameroon. Photo credit: Ninying Benedicta

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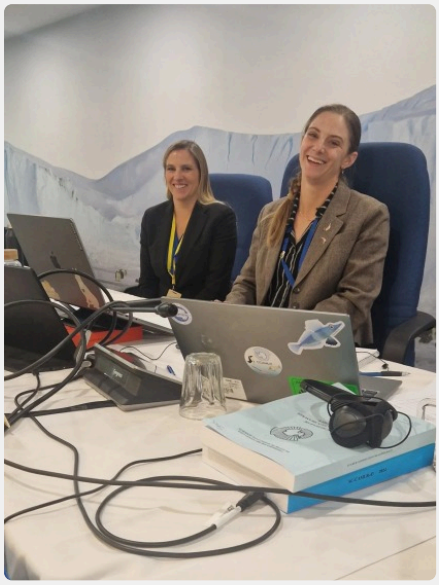
Conferences and Events

AUGUST 2025

Advancing tools to support and test an integrated biodiversitymonitoring system for Colombia's Protected Areas

In August 2025, a three-session virtual training retreat successfully transferred a new satellite data workflow to Colombia's National System of Protected Areas remote sensing team, delivering significant operational improvements. The workflow, which integrates analysis-ready Landsat datasets and OPERA-DIST global disturbance data with machine learning models, achieved 8-20% higher accuracy in annual land cover mapping compared to the national reference map and 80% accuracy in distinguishing human transformation events from natural disturbances. Training 11 GIS and remote sensing analysts, the retreat advanced participants from basic to intermediate skills while providing a critical solution for automated land cover mapping and quarterly ecosystem transformation alerts—particularly vital given recent loss of high-resolution imagery access previously used to produce the alerts. The workflow developed as part of the project led by Dr. Mary

Blair at the American Museum of Natural History, enables better detection of small disturbances previously undetected and streamlines production of annual Landsat composites, directly supporting conservation decision-making with timely, well-informed data for ecosystem protection.

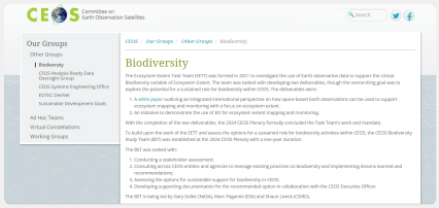


OCTOBER 2025

Antarctic Ecosystem Value Index Web Tool

Project team members Dr. Cassandra Brooks and Dr. Zephyr Sylvester presented the Antarctic Ecosystem Value Index web tool to members of the international community attending the annual Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) in Hobart, Tasmania in October 2025. CCAMLR is an international body of member nation states that work to enact Antarctic marine policy and attendance at the meeting is by invitation only.A major focus of the project, led by Alice DuVivier at NSF NCAR, was to complete a web-based tool highlighting Antarctic conservation that would be used by the general public, policy makers, and scientists as part of the unique Antarctic policy process. The team completed the web tool with a mix of map tools and storytelling and presented it at the CCAMLR annual meeting. The team members received a lot of positive feedback from the international policy attendees about how useful it would be.

Learn more



NOVEMBER 2025

Towards a CEOS Biodiversity Virtual Constellation

CEOS, the Committee on Earth Observation Satellites, is the coordination body for the world's space agencies with a focus on applications for societal benefit. Historically, CEOS has focused largely on climate and disasters, as well as capacity building, but five years ago NASA instigated discussions on adding a biodiversity component to CEOS activities. Following a four years of steady increase in interest and support, an initial proposal was submitted by the Biodiversity Study Team recommending creation of a Biodiversity Virtual Constellation. This initial proposal was approved at the November 2025 CEOS Plenary--a major

milestone. A final proposal will be developed and up for approval at the next CEOS meeting in April 2026.

Learn more

Community Spotlight

New MRRMaid RShiny Application

Dr. Nick Kolarik is a postdoctoral researcher at Boise State University with Dr. Jodi Brandt. He is interested in using geospatial data to quantify the impact of conservation initiatives and ecosystem restoration. “Our project has developed an earth observation-based system for monitoring mesic ecosystems in semi-arid regions, the Mesic Restoration Monitoring aid Toolbox (MRRMaid). The purpose of the MRRMaid is to provide science-based guidance for beaver rewilding, for which we rely on remotely sensed datasets. With this tool, we demonstrate a range of time series analysis techniques for quantifying change in time series of observations at river restoration sites and highlight uses for each. We have collated the methods described in our new paper, ‘Time series analysis to demonstrate restoration outcomes and system change from satellite data’ (10.1111/rec.70184), into a RShiny application where end-users can apply methods using a graphical user interface to downloaded data from the Monthly MRRMaid GEE application.”

Access RShiny Application

NASA Earth Science Research Portal

The NASA Earth Science Research Results Portal is an internal database designed to make it easier for NASA Headquarters Leadership to find, communicate, and promote YOUR accomplishments. NASA funded investigators are encouraged to submit publications, impact stories, photos of field work, scientific visualizations and or other products that demonstrate how important NASA’s unique perspective is for understanding Earth systems. Please direct questions to Megan McGroddy: megan.e.mcgroddy@nasa.gov.

Access the NASA Earth Science Research Results Portal

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The BDEC programs support basic and applied research as part of NASA's Earth Science Division.

BDEC Team

Turner, Woody (HQ-DK000)
AST, SCIENCE PROGRAM MANAGEMENT

Program Manager, NASA HQ

Gaddis, Keith D. (HQ-DK000)
AST, Science Program Management

Program Manager, NASA HQ

Nackoney, Janet R. (HQ-DH000)[Agile Decision Sciences]
Support Scientist

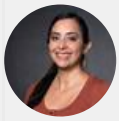
Program Coordinator, NASA HQ

Estes, Maury G. (MSFC-ST11)[UAH]
PRINCIPAL RESEARCH SCIENTIST III/ASSOCIATE PM FOR NASA ECOL. FO

Associate Program Manager, NASA MSFC (UAH)

Rogers, Laura {HQ} (LARC-E3)
AST, SCIENCE PROGRAM MANAGEMENT

Associate Program Manager, NASA LaRC

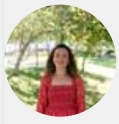


Delgado Arias, Sabrina (GSFC-618.0) [SCIENCE SYSTEMS AND APPLICATIONS INC]
SUPPORT SCIENTIST

Associate Program Manager, NASA GSFC (SSAI)

Flores-Anderson, Africa Ixmucane (MSFC-ST11)
RSCH AST, EARTH SCIENCES REMOTE SENS

Associate Program Manager, NASA MSFC



Cooke, Lillian B. (GSFC-618.0)[SCIENCE SYSTEMS AND APPLICATIONS INC]
Associate Scientific Analyst

Associate Scientific Analyst, NASA GSFC (SSAI)

NASA Headquarters

300 E St. SW

Washington, D.C.20546

Visit the BDEC website

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